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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the technical realization of the 5GC Service Based Architecture, protocols supported over the Service Based Interfaces, and the functionalities supported in the Service Based Architecture.

The service requirements for the 5G system are defined in 3GPP TS 22.261 [2]. The system architecture requirements are defined in 3GPP TS 23.501 [3] and the procedures and flows in 3GPP TS 23.502 [4].

The design principles and documentation guidelines for 5GC SBI APIs are specified in 3GPP TS 29.501 [5].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.261: "Service requirements for the 5G system; Stage 1".

[3] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[4] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[5] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[6] IETF RFC 793: "Transmission Control Protocol".

[7] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[8] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[9] OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[10] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[11] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[12] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[13] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[14] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[15] 3GPP TS 23.003: "Numbering, addressing and identification".

[16] IETF RFC 5681: "TCP Congestion Control".

[17] 3GPP TS 33.501: "Security Architecture and Procedures for 5G System".

[18] IANA: "SMI Network Management Private Enterprise Codes", http://www.iana.org/assignments/enterprise-numbers.

[19] IETF RFC 7944: "Diameter Routing Message Priority".

[20] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[21] IETF RFC 7235: " Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[22] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[23] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".

[24] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[25] IETF RFC 7516: "JSON Web Encryption (JWE)".

[26] IETF RFC 7515: "JSON Web Signature (JWS)".

[27] 3GPP TS 29.573: "5G System: Public Land Mobile Network (PLMN) Interconnection; Stage 3".

[28] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[29] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[30] Void.

[31] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[32] 3GPP TS 29.531: "5G System; Network Slice Selection Services; Stage 3".

[33] IETF RFC 7694: "Hypertext Transfer Protocol (HTTP) Client-Initiated Content-Encoding".

[34] IETF RFC 1952: "GZIP file format specification version 4.3".

[35] 3GPP TS 29.525: "5G System; UE Policy Control Service; Stage 3".

[36] IETF RFC 3040: "Internet Web Replication and Caching Taxonomy".

[37] IETF RFC 5322: "Internet Message Format".

[38] 3GPP TS 23.527: "5G System; Restoration Procedures".

[39] 3GPP TS 29.303: "Domain Name System Procedures; Stage 3".

[40] 3GPP TS 29.515: "5G System; GMLC Services; Stage 3".

[41] IETF RFC 7519: "JSON Web Token (JWT)".

[42] 3GPP TS 32.291: "5G System; charging service; Stage 3".

[43] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF".

[44] 3GPP TS 29.526: "5G System; Network Slice-Specific Authentication and Authorization (NSSAA) Services; Stage 3".

[45] 3GPP TS 29.562: " 5G System; Home Subscriber Server (HSS) Services for interworking with the IP Multimedia Subsystem (IMS); Stage 3".

[46] 3GPP TS 29.555: "5G System; 5G Direct Discovery Name Management Services; Stage 3".

[47] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace".

[48] IETF RFC 1866: "Hypertext Markup Language - 2.0".

[49] IETF RFC 1738: "Uniform Resource Locators (URL)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1], 3GPP TS 23.501 [3] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Binding indication (consumer): Binding can be used by the NF Service Consumer to indicate suitable NF Service Consumer instance(s) for notification target instance selection, reselection and routing of subsequent notification requests associated with a specific notification subscription. Binding indication needs to be stored by the NF Service Producer. Binding indication may also be used later if the NF Service Consumer starts acting as NF Service Producer, so that service requests can be sent to this NF Service Producer. See clauses 3.1 and 6.3.1.0 in 3GPP TS 23.501 [3]. See also Routing binding indication.

Binding indication (producer): Binding can be used to indicate suitable target NF Service Producer instance(s) for an NF service instance selection, reselection and routing of subsequent requests associated with a specific NF Service Producer resource (context) and NF service. Binding allows the NF Service Producer to indicate to the NF Service Consumer if a particular context should be bound to an NF service instance, NF instance, NF service set or NF set. Binding indication needs to be stored by the NF Service Consumer. See clauses 3.1 and 6.3.1.0 in 3GPP TS 23.501 [3]. See also Routing binding indication.

Binding entity: Either of the following identifiers: NF Service Instance, NF Service Set, NF Instance or an NF Set. The relation between these are explained below.

Binding entity ID: An identification of a binding entity, i.e. NF Service Instance ID, NF Service Set ID, NF Instance ID or an NF set ID.

Binding level: A parameter (bl) in "3gpp-Sbi-Routing-Binding" and "3gpp-Sbi-Binding" HTTP custom headers, which indicates the binding entity towards which a preferred binding exists (i.e. either to NF Service Instance, NF Service Set, NF Instance or an NF Set). Other binding entities in these headers, which do not correspond to the binding level indicate alternative binding entities that can be reselected and that share the same resource contexts (see Table 6.3.1.0-1 in 3GPP TS 23.501 [3]).

Callback URI: URI to be used by an NF Service Producer to send notification or callback requests.

Endpoint address: An address in the format of an IP address, transport and port information, or FQDN, which is used to determine the host/authority part of the target URI. This Target URI is used to access an NF service (i.e. to invoke service operations) of an NF service producer or for notifications to an NF service consumer. See clauses 3.1 and 6.3.1.0 of 3GPP TS 23.501 [3].

NF Instance: An identifiable instance of the NF. An NF Instance may provide services offered by one or more NF Service instances.

NF Service Instance: An identifiable instance of the NF service.

NF Service Set: A group of interchangeable NF service instances of the same service type within an NF instance. The NF service instances in the same NF Service Set have access to the same context data.

NF Set: A group of interchangeable NF instances of the same type, supporting the same services and the same Network Slice(s). The NF instances in the same NF Set may be geographically distributed but have access to the same context data.

Notification endpoint: Notification endpoint is a destination URI of the network entity where the notification is sent. See clause 6.3.1.0 in 3GPP TS 23.501 [3].

Routing binding indication: Information included in a request or notification and that can be used by the SCP for discovery and associated selection to of a suitable target. See clauses 3.1, 6.3.1.0 and 7.1.2 in 3GPP TS 23.501 [3]. Routing binding indication has similar syntax as a binding indication, but it has different purpose. Routing binding indication provides the receiver (i.e. SCP) with information enabling to route an HTTP request to an HTTP server that can serve the request. Routing binding indication is not stored by the receiver.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

GZIP GNU ZIP
LC-H Load Control based on LCI Header
LCI Load Control Information
MCX Mission Critical Service
MPS Multimedia Priority Service
OCI Overload Control Information
OLC-H Overload Control based on OCI Header
SCP Service Communication Proxy
SEPP Security and Edge Protection Proxy
SMP SBI Message Priority

3.3 Special characters, operators and delimiters

3.3.1 General

A number of characters have special meaning and are used as delimiters in this document and also in other stage 3 SBI specifications. Below clauses specify the usage of a selected set of the special characters. Full set of these special characters are specified in the respective IETF specifications.

3.3.2 ABNF operators

/ Operator. The forward slash character separates alternatives. See clause 3.2 in IETF RFC 5234 [43].

Operator. The number sign character allows for compact definition of comma-separated lists, similar to the "*" operator. See clause 1.2 in IETF RFC 7230 [12].

= Special character. The equal sign character separates an ABNF rule name from the rule elements. See clause 2.2 in IETF RFC 5234 [43].

[ ] Operator. The square bracket characters enclose an optional element sequence. See clause 3.8 in IETF RFC 5234 [43].

< > Special characters. The angle bracket characters typically enclose an ABNF rule element (they are optional). See clause 2.1 in IETF RFC 5234 [43].

* Operator. The star character precedes an element and indicates the elements repetition. See clause 3.6 in IETF RFC 5234 [43].

; Operator. Semicolon character indicates the start of a comment that continues to the end of line. See clause 3.9 in IETF RFC 5234 [43].

NOTE: The same characters, like "/", "#", etc. lead to different processing in ABNF and URI grammars. For instance, in URI syntax, ";" character separates parameter and its value, while in ABNF ";" starts a comment. Besides, unlike URI syntax, neither "?", nor ":" operators are specified for ABNF.

3.3.3 URI – reserved and special characters

Special characters that are used as delimiters in URI syntax have somewhat different purpose from the same characters when used by ABNF syntax. See clause 3.3.3 in 3GPP TS 29.501 [5].

3.3.4 SBI specific usage of delimiters

See clause 3.3.4 in 3GPP TS 29.501 [5].

4 Service Based Architecture Overview

4.1 NF Services

3GPP TS 23.501 [3] defines the 5G System Architecture as a Service Based Architecture, i.e. a system architecture in which the system functionality is achieved by a set of NFs providing services to other authorized NFs to access their services.

Control Plane (CP) Network Functions in the 5G System architecture shall be based on the service based architecture.

A NF service is one type of capability exposed by a NF (NF Service Producer) to other authorized NF (NF Service Consumer) through a service based interface. A NF service may support one or more NF service operation(s). See clause 7 of 3GPP TS 23.501 [3].

Network Functions may offer different functionalities and thus different NF services. Each of the NF services offered by a Network Function shall be self-contained, acted upon and managed independently from other NF services offered by the same Network Function (e.g. for scaling, healing).

4.2 Service Based Interfaces

A service based interface represents how the set of services is provided or exposed by a given NF. This is the interface where the NF service operations are invoked.

The service based Control Plane interfaces within the 5G Core Network are specified in 3GPP TS 23.501 [3].

4.3 NF Service Framework

4.3.1 General

The Service Based Architecture shall support the NF Service Framework that enable the use of NF services as specified in clause 7.1 of 3GPP TS 23.501 [3].

The NF Service Framework includes the following mechanisms:

- NF service registration and de-registration: to make the NRF aware of the available NF instances and supported services (see clause 7.1.5 of 3GPP TS 23.501 [3]);
- NF service discovery: to enable a NF Service Consumer to discover NF Service Producer instance(s) which provide the expected NF service(s) (see clause 7.1.3 of 3GPP TS 23.501 [3]);
- NF service authorization: to ensure the NF Service Consumer is authorized to access the NF service provided by the NF Service Producer (see clause 7.1.4 of 3GPP TS 23.501 [3]);
- Inter service communication: NF Service Consumers and NF Service Producers may communicate directly or indirectly via a Service Communication Proxy (SCP). Whether a NF uses Direct Communication or Indirect Communication via an SCP is based on configuration of the NF.

The stage 3 procedures for NF service registration and de-registration, NF service discovery and NF service authorization are defined in 3GPP TS 29.510 [8].

4.3.2 NF Service Advertisement URI

When invoking a service operation of a NF Service Producer that use HTTP methods with a message body (i.e. PUT, POST and PATCH), the NF Service Consumer may provide NF Service Advertisement URI(s) in the service operation request, based on operator policy, if it expects that the NF Service Producer may subsequently consume NF service(s) which the NF Service Consumer can provide (as a NF Service Producer).